

WHAT IS CLAIMED IS:

1. A pattern inspection apparatus which performs die-to-die inspection of comparing detected pattern data of one area with detected pattern data of another area among a plurality of repeated pattern areas,  
5 comprising:

first imaging optics which forms first optical image of a pattern formed on an inspection target plate on the basis of design pattern data;

10 a detected pattern data generator which detects the first optical image and generates first detected pattern data;

second imaging optics which forms second optical image of the pattern, the second imaging optics serving  
15 to scan an entire region of the pattern on the inspection target plate with an optical magnification lower than that of the first imaging optics;

a low-resolution image data generator which generates second detected pattern data corresponding to  
20 the entire region of the pattern on the inspection target plate by using the second optical image;

a repeated pattern area detector which detects the plurality of repeated pattern areas from the second detected pattern data; and

25 a comparator which sequentially compares the first detected pattern data corresponding to the plurality of repeated pattern areas detected by the repeated pattern

area detector in accordance with die-to-die comparison.

2. An apparatus according to claim 1, wherein the repeated pattern area detector detects the plurality of repeated pattern areas by pattern matching on the basis of a similarity in a pattern layout of the second detected pattern data.

3. An apparatus according to claim 2, wherein the similarity in the pattern includes a pitch and size of the plurality of repeated pattern areas.

4. An apparatus according to claim 1, wherein the repeated pattern area detector further performs detection of the plurality of repeated pattern areas on the basis of the design pattern data.

5. An apparatus according to claim 1, wherein the repeated pattern area detector detects whether candidates for the plurality of repeated pattern areas exist in the second detected pattern data, measures area sizes of the candidates with a first optical magnification lower than an optical magnification of the first imaging optics if the candidates exist, re-acquires image data of the pattern with a second optical magnification higher than the first optical magnification within the detected area sizes, judges a coincidence degree of the candidates on the basis of the re-acquired image data, and registers the candidates, when judged to coincide, as the plurality of repeated pattern areas.

6. An apparatus according to claim 5, wherein the second imaging optics has at least two optical magnifications which are to be switched, and the repeated pattern area detector re-acquires the image data of the pattern by switching the optical magnification of the second imaging optics to the second optical magnification, which is higher than the first optical magnification.

7. An apparatus according to claim 5, wherein the repeated pattern area detector re-acquires the image data of the pattern by using the first imaging optics.

8. An apparatus according to claim 1, wherein the repeated pattern area detector sets the plurality of repeated pattern areas to be detected to those having rectangular shapes.

9. An apparatus according to claim 8, wherein the repeated pattern area detector sets the plurality of repeated pattern areas to those having a size not smaller than 1 mm square.

10. An apparatus according to claim 1, wherein the repeated pattern area detector detects a size or number of the repeated pattern areas input in advance before detection operation, and thereafter starts the detection operation.

11. A pattern inspection apparatus which performs die-to-die inspection of comparing detected pattern data of one area with detected pattern data of another

area among a plurality of repeated pattern areas, and die-to-database inspection of comparing the detected pattern data with reference pattern data obtained from design pattern data, comprising:

5           first imaging optics which form a first optical image of a pattern formed on an inspection target plate on the basis of the design pattern data;

          a detected pattern data generator which detects the optical image and generates the detected pattern  
10       data;

          a repeated pattern area detector which generates image data of an entire region of the pattern from the design pattern data with a pixel size corresponding to a first optical magnification lower than an optical  
15       magnification of the first imaging optics, and detects the plurality of repeated pattern areas from the image data; and

          a comparator which sequentially compares a plurality of detected pattern areas on the second  
20       detected pattern data corresponding to the plurality of repeated pattern areas detected by the repeated pattern area detector in accordance with die-to-die comparison.

12. An apparatus according to claim 11, wherein the repeated pattern area detector detects whether  
25       candidates for the plurality of repeated pattern areas exist in the design pattern data, measures area sizes of the candidates with a first optical magnification

lower than an optical magnification of the first  
imaging optics if the candidates exist, re-acquires  
image data of the pattern with a second optical  
magnification higher than the first optical  
5 magnification or with a pixel size corresponding to the  
second optical magnification within the detected area  
sizes, judges a coincidence degree of the candidates on  
the basis of the re-acquired image data, and registers  
the candidates, when judged to coincide, as the  
10 plurality of repeated pattern areas.

13. An apparatus according to claim 12, wherein  
the repeated pattern area detector re-acquires the  
image data from the design pattern data with the pixel  
size corresponding to the second optical magnification.

15 14. An apparatus according to claim 12, wherein  
the apparatus further comprises a second imaging  
optics which forms a second optical image of the  
pattern, the second imaging optics having the second  
optical magnification higher than the first optical  
20 magnification, and

the repeated pattern area detector re-acquires the  
image data from the second optical image.

15. An apparatus according to claim 12, wherein  
the repeated pattern area detector re-acquires the  
25 image data from the first optical image of the first  
imaging optics.

16. An apparatus according to claim 11, wherein

the repeated pattern area detector sets the plurality of repeated pattern areas to be detected to those having rectangular shapes.

17. An apparatus according to claim 16, wherein  
5 the repeated pattern area detector sets the plurality of repeated pattern areas to those having a size not smaller than 1 mm square.

18. An apparatus according to claim 11, wherein  
10 the repeated pattern area detector detects a size or number of the repeated pattern areas input in advance before detection operation, and thereafter starts the detection operation.

19. A pattern inspection apparatus which performs die-to-die inspection of comparing detected pattern  
15 data of one area with detected pattern data of another area among a plurality of repeated pattern areas, and die-to-database inspection of comparing the detected pattern data with reference pattern data obtained from design pattern data, comprising:

20 imaging optics which form an optical image of a pattern formed on an inspection target plate on the basis of the design pattern data;

a detected pattern data generator which detects the optical image and generates the detected pattern  
25 data;

a repeated pattern area detector which analyzes layout information of the design pattern data and

detects the plurality of repeated pattern areas; and

a comparator which sequentially compares a plurality of detected pattern areas on the second detected pattern data corresponding to the plurality of repeated pattern areas detected by the repeated pattern area detector in accordance with die-to-die comparison.

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20. An apparatus according to claim 19, wherein the repeated pattern area detector sets the plurality of repeated pattern areas to be detected to those having rectangular shapes.

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21. An apparatus according to claim 19, wherein the repeated pattern area detector sets the plurality of repeated pattern areas to those having a size not smaller than 1 mm square.

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22. An apparatus according to claim 19, wherein the repeated pattern area detector detects a size or number of the repeated pattern areas input in advance before detection operation, and thereafter starts the detection operation.